

# **Nonlinear Operators and Nonlinear Equations of Evolution in Banach Spaces**



**PROCEEDINGS OF  
SYMPOSIA IN  
PURE MATHEMATICS**

**VOLUME XVIII - Part 2**

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EQUATIONS OF EVOLUTION IN BANACH SPACES**

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Volume XVIII, Part 2

**NONLINEAR OPERATORS  
AND NONLINEAR EQUATIONS OF  
EVOLUTION IN BANACH SPACES**

By

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## PREFACE

The present volume contains the book-length text of a paper entitled "Nonlinear operators and nonlinear equations of evolution in Banach spaces" composed in its entirety during the calendar year 1968 to be published as part of the Proceedings of the Symposium on Nonlinear Functional Analysis held in connection with the April 1968 meeting in Chicago of the American Mathematical Society. This paper is in fact a detailed treatment in book form of most of the major branches of nonlinear functional analysis as they had developed up to 1968, and no significant alterations or additions have been made since that time except for the correction of errors in detail. Since the manuscript of this work has had a wide circulation in mimeographed form and been referred to in a considerable number of research papers since 1968, an explanation for the rather belated publication of this book is called for.

The observant reader will note that despite the presence of a very lengthy bibliography of papers and books on nonlinear functional analysis which had appeared or existed in preprint form by the end of 1968, the discussion of the text does not give references to the literature for the origin of results presented nor does it indicate that some of the results were developed here for the first time. It was the writer's original intention to add an additional section to the present text developing such references in detail and presenting a historical survey of the development of nonlinear functional analysis in the past decade. It was the difficulties encountered in fulfilling this intention in a completely adequate and precise way together with the pressure of other work which led to the initial delay in publication of this book. The initial delay, and the effect that it had in making some of the historical material which had been prepared out of date in terms of new perspectives and new results on some of the topics of major interest, made it obvious that an additional section surveying the whole field of nonlinear functional analysis and its development would have to contain a good deal of additional material covering new results and new ideas since 1968. As time has passed, it has become clear that this additional section of the present book would be a complete new book in its own right. This is the crucial reason for the publication of this book six years late in 1976 rather than 1969.

It is my firm conviction, which is shared by other workers in this field whose judgement I trust, that despite this delay the publication of the text in its present form is still of great value. This is the case both because of the text's presence as an "underground" part of the literature and the many references to it in the papers since 1968 and because it still is the only treatment in systematic form of the field of nonlinear functional analysis as a whole which deals with the major developments of the 1960's. It is my hope to write the book on the more recent development of nonlinear functional analysis which was the logical outcome of the uncompleted

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effort involved in the present work and to include the historical survey which was omitted here. The rapid development of this rapidly growing field makes this task far from easy, but one which I regard as of great potential usefulness to the mature development of nonlinear functional analysis. In the meantime, however, the text of the original manuscript is presented here with the hope that it will be of value to workers and students of this field.

FELIX E. BROWDER

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